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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/941,418	08/28/2001	Richard K. Karlquist	10004115-1	7352

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EXAMINER	
GENACK, MATTHEW W	

ART UNIT	PAPER NUMBER
2645	

DATE MAILED: 11/23/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/941,418	KARLQUIST, RICHARD K.	
	Examiner	Art Unit	
	Matthew W. Genack	2645	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *28 August 2001*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-24* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-24* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *28 August 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *28 August 2001*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-5, 6-8, and 10 are rejected under 35 U.S.C. 102(b) as being anticipated by Muterspaugh, U.S. Patent No. 5,157,786.

Regarding Claims 1-5 and 6-8, Muterspaugh discloses a biasing network for a balanced mixer, wherein said mixer includes either one or two pairs of switching type diodes, said biasing network resulting in the voltage across the mixer diodes being slightly lower than the threshold voltage for conduction, and the mixer accepts an input from a local oscillator (LO) and also a signal, labeled RF, and outputs a signal labeled IF (Abstract, Column 2 Lines 12-26, Column 5 Lines 35-40, Column 9 Lines 6-10, Figs. 1-3). Since mixers can be used to up-convert signals as well as to down-convert signals, these labels are arbitrary, and the input, RF, may be of lower frequency than the output, IF, if the mixer is used to up-convert an input RF signal; one could adopt the convention that RF is of higher frequency than IF, in which case the labels would be reversed when the mixer of Muterspaugh's is used as an up-converter. The use of DC biasing with the mixer diodes results in improved mixer performance (Abstract, Column 6 Lines 28-41), and also allows for an LO amplitude less than the diode turn on voltage of 0.3 Volts (Abstract, Column 6 Lines 63-68, Column 7 Lines 64-66, Fig. 4). The sum

of the DC bias voltage and the LO drive periodically turns on the mixer diodes (Column 5 Lines 19-31).

Regarding Claim 10, Muterspaugh discloses a DC bias of 0.225 Volts for each mixer diode (Column 6 Lines 43-68, Figs. 1 and 4). Furthermore, Muterspaugh discloses a LO amplitude range of -3 dBm to 7 dBm (Column 7 Lines 64-66). In a 50 Ohm system, which is a standard characteristic impedance for RF and microwave systems, power and voltage are related by the equation Power = V^2/(50 Ohms). Furthermore, Power (dBm) = 10*$\log_{10}$(Power/1 mW). Thus, - 3 dBm = 0.501 mW. Converting this power level to a voltage in a 50 Ohm system yields 0.158 Volts.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 9 and 11-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Muterspaugh in view of Clark *et. al.*, U.S. Patent No. 6,041,077.

Regarding Claim 9, Muterspaugh does not expressly disclose the use of a three-pair measurement method.

Clark *et. al.* discloses a three-pair measurement method involving the determination of amplitude and phase information associated with frequency translating devices, mixers, that are a part of the three-pair, wherein one element of said three-pair,

TM1, is used as down-converter in one measurement step and as an up-converter in another measurement step (Abstract, Column 3 Lines 1-31, Figs. 1-4).

At the time that the invention was made, it would have been obvious to one of ordinary skill in the art to modify the invention of Muterspaugh by using the mixer circuit as a test mixer in a three-pair measurement method.

One of ordinary skill in the art would have been motivated to make this modification because of the improved performance made possible by the DC biasing network (Muterspaugh: Abstract, Column 6 Lines 28-41), and the need for improved mixer performance in the form of reciprocal conversion response for said mixer to be used in a three-pair measurement method (Clark *et. al.*: Column 2 Lines 19-27).

Regarding Claims 11, 13, and 19, Muterspaugh discloses a biasing network for a balanced mixer, wherein said mixer includes either one or two pairs of switching type diodes, said biasing network resulting in the voltage across the mixer diodes being slightly lower than the threshold voltage for conduction, and the mixer accepts an input from a local oscillator (LO) and also a signal, labeled RF, and outputs a signal labeled IF (Abstract, Column 2 Lines 12-26, Column 5 Lines 35-40, Column 9 Lines 6-10, Figs. 1-3). Since mixers can be used to up-convert signals as well as to down-convert signals, these labels are arbitrary, and the input, RF, may be of lower frequency than the output, IF, if the mixer is used to up-convert an input RF signal; one could adopt the convention that RF is of higher frequency than IF, in which case the labels would be reversed when the mixer of Muterspaugh's is used as an up-converter. The use of DC biasing with the mixer diodes results in improved mixer performance (Abstract, Column

6 Lines 28-41), and also allows for an LO amplitude less than the diode turn on voltage of 0.3 Volts (Abstract, Column 6 Lines 63-68, Column 7 Lines 64-66, Fig. 4). The sum of the DC bias voltage and the LO drive periodically turns on the mixer diodes (Column 5 Lines 19-31).

Muterspaugh does not expressly disclose the use of a three-pair measurement method involving specific combinations of elements of a group of three frequency translating devices, said method involving the use of an analyzer and a controller.

Clark *et. al.* discloses a three-pair measurement method involving the determination of amplitude and phase information associated with frequency translating devices, mixers, that are a part of the three-pair, wherein a device under test (DUT) is connected to test mixer 1 (TM1) for the first measurement step, the DUT is connected to test mixer 2 (TM2) for the second measurement step, and TM1 is connected to TM2 for the third measurement step, with TM1 used as a down-converter in one measurement step and as an up-converter in another measurement step (Abstract, Figs. 2 and 4). The three-pair measurement system includes a vector network analyzer that provides an input at a first connection and samples an output at a second connection, as well as a controller for calculating the conversion responses of all three measurements (Column 4 Lines 13- 48, Figs. 1 and 3).

At the time that the invention was made, it would have been obvious to one of ordinary skill in the art to modify the invention of Muterspaugh by using the mixer circuit as a test mixer with reciprocal conversion response (TM1), such that a device under test (DUT) is connected to test mixer 1 (TM1) for the first measurement step, the DUT is

connected to test mixer 2 (TM2) for the second measurement step, and TM1 is connected to TM2 for the third measurement step, with TM1 used as a down-converter in one measurement step and as an up-converter in another measurement step,

One of ordinary skill in the art would have been motivated to make this modification because of the improved performance made possible by the DC biasing network (Muterspaugh: Abstract, Column 6 Lines 28-41), and the need for improved mixer performance in the form of reciprocal conversion response for said mixer to be used in a three-pair measurement method (Clark *et. al.*: Column 2 Lines 19-27).

Muterspaugh discloses the limitations of Claims 12, 15-17, 20-22 (see the 35 U.S.C. 102(b) rejections).

Regarding Claims 14 and 23, Muterspaugh does not expressly disclose the placement of an attenuation circuit between the LO source and the mixer diodes.

Clark *et. al.* discloses a splitter and two isolators between the LO and the two frequency translating devices (one isolator per branch) (Figs. 1 and 3). The splitter and the two isolators act as attenuators since no circuit has zero insertion loss.

At the time that the invention was made, it would have been obvious to one of ordinary skill in the art to modify the invention of Muterspaugh as previously modified by Clark *et. al.* by including an attenuation circuit between the LO and the reciprocal frequency translating device.

One of ordinary skill in the art would have been motivated to make this modification because a low power LO signal results in better performance.

Regarding Claims 18 and 24, Muterspaugh does not expressly disclose the use of a signal phase shifted by ninety degrees.

Clark *et. al.* discloses a phase shifter for shifting the phase of the LO signal to the down-converter by ninety degrees and repeating the three conversion measurements (Column 3 Line 52 to Column 4 Line 12, Column 7 Lines 4-19, Column 11 Lines 31-41, Column 12 Lines 7-26, Figs. 3-4).

At the time that the invention was made, it would have been obvious to one of ordinary skill in the art to modify the invention of Muterspaugh as previously modified by Clark *et. al.* by including a phase shifter for shifting the phase of the LO signal to the down-converter by ninety degrees and repeating the three conversion measurements.

One of ordinary skill in the art would have been motivated to make this modification as to separate sideband outputs of double sideband mixers (Clark *et. al.*: Column 3 Line 52 to Column 4 Line 12).

Conclusion

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew W. Genack whose telephone number is 571-272-7541. The examiner can normally be reached on FLEX.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Fan Tsang can be reached on 571-272-7547. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Matthew Genack

Examiner

Art Unit 2645

Matthew Genack

14 November 2005

FAN TSANG
SUPERVISORY PATENT EXAMINER
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